ORIGINAL ARTCILE

DEVELOPMENT AND VALIDATION OF THE BRAIN FAG PROPENSITY SCALE

*David O. Igbokwe and **Bolanle A. Ola

***Psychology Department, School of Human Resource Development, College of Development Studies, Covenant University, Canaanland, P.M.B. 1023, Ota, Ogun State, Nigeria; Department of Behavioural Medicine, Faculty of Clinical Sciences, Lagos State University College of Medicine, PMB 21266, Ikeja, Lagos, Nigeria.**

Abstract

Objective: Brain Fag Syndrome (BFS) is a psychiatric disorder associated with study among African students. Among secondary school students, it affects two to four out of every ten students. One of the consequences of this illness is early foreclosure of education in affected students. However, clinical experience suggests that many students have sub-threshold symptoms of brain fag and are at risk for developing brain fag syndrome. This study aimed to develop a valid and reliable psychometric instrument that measures brain fag syndrome propensity. *Methods:* External and internal expert panels as well as a patient focus group evaluated a large pool of potential item stems gathered from the psychological and psychiatric literature. Potential scale items were then administered to 250 students along with a set of validating questionnaires. Final item selection was based upon rigorous empirical criteria and the psychometric properties of the final scale were examined. *Results:* A final four dimensional 20-item scale, the Brain Fag Syndrome Propensity Scale, has a Cronbach's alpha of 0.795, split half reliability of 0.813 for the part 1 (10 items) and 0.585 for the part 2 (10 items), and Spearman-Brown coefficient of 0.557. The intrinsic validity yielded a coefficient of 0.892. *Conclusion:* The current results indicate the BFPS has an excellent internal consistency as well as good content and concurrent validity and should have significant utility as a brief, valid measure of propensity to develop brain fag syndrome or sub-threshold cases of BFS. ***ASEAN Journal of Psychiatry, Vol.12(1), Jan – June 2011: XX XX.***

Keywords: Brain Fag Propensity, Factorial Validity, Nigerian

Introduction

Mental illnesses in general are among the most common, disabling and costly of medical conditions and are viable threats to the realization of the Millennium Development Goals [1 – 3]. The common mental disorders such as depression, anxiety, alcohol and substance use disorders readily come to mind. However, culture related psychiatric illnesses such as the Brain Fag Syndrome (BFS) which is prevalent in Africa are viable threats to the Millennium Development Goals. BFS is a psychiatric illness that affects academic performance and has important implications for the development of self, society and the nation.

Prince first described this psychiatric illness associated with study performance among African students in 1960 and he called this illness the Brain Fag Syndrome (BFS). The phrase “brain fag” named by which the students themselves was believed to be due to brain fatigue [4]. This psychological syndrome was a major challenge in the educational sector in Nigeria and Africa from the early sixties up until the very late nineties, resulting in parents preventing their children from taking any form of caffeinated substances or reading all through the night during examinations.

The BFS is a culture bound syndrome, just like *Koro* syndrome and other culture related syndromes [5]. This is because it is a collection of symptoms and signs that is restricted to a limited number of cultures primarily by reason of certain of their psychosocial features. "Brain tiredness" or fatigue from "too much thinking" is an idiom of distress in many cultures [6]. The construct of BFS underlies a tetrad of somatic complaints; cognitive impairment; sleep related complaints; and other somatic impairments. It is a distinct nosological entity that shares features of anxiety, somatisation, obsessive compulsive and depressive disorders [7-10].

BFS typically begins after an intensive period of intellectual activity. According to Prince, who first reported the syndrome, the specific symptoms of brain fag include difficulties in concentrating, remembering, and thinking [11]. Students often state that their brains are "fatigued", and they have unpleasant head symptoms; visual symptoms and other symptoms (inability to grasp meaning of printed symbols, spoken words, poor retention, poor concentration, fatigue, or sleepiness (in spite of adequate rest). Additional symptoms include pain, feelings of pressure in the head or neck, tightness, blurring of vision, heat, or burning sensation, rapid heartbeat, crawling sensations under the skin, feelings of weakness and depression .

BFS can be diagnosed using a self-report 7-item Brain Fag Syndrome Scale (BFSS) first developed by Prince in 1962 but in 1979 was modified by Morakinyo and Prince [7]. The use of BFSS in surveys of BFS has been sparse after reviewing published studies electronically. BFSS was used in about 38% of all published BFS articles [10]. Other studies of BFS have used other instruments apart from BFSS. Possible reasons include the idea that BFS is seen as equivalent to somatisation, anxiety or depressive disorders; or that BFSS is only reliable but not valid instrument. BFSS has been found to be a reliable instrument in a recent study [12]. However, its discriminant validity is questionable though no study has critically examined it. Second, the scale has been criticized on content grounds. The BFSS consist of items tapping various symptoms of anxiety and depression; the inclusion of this anxiety-related and depression content obviously contributes to the discriminant validity problems noted earlier. In addition to the tapping of overlapping syndromes, the instrument, from a review of existing literatures, also could be criticized because its content is not sufficiently comprehensive. The third limitation is that this measure originally was created to yield a single, overall score. This focus on overall scores ignores the heterogeneous and multidimensional nature of Brain Fag symptoms.

Although, the BFSS measure has made a valuable contribution to the clinical literature, the accumulating research has exposed some of its limitations, thereby establishing the need to develop alternative measures. As a result of brain-fag-like complaints by student population without the manifestation of BFS in the clinical practice of the authors, there arose the need to use an alternative measure to assess these complaints. Most of these complaints were Brain Fag related complaints but not Brain Fag Syndrome. It pointed to the fact that patients presenting such complaints had the proclivity or the propensity of the complaints exacerbating to brain fag syndrome. This study aimed to develop a scale to measure the propensity to brain fag syndrome and had the following objectives: (i) to develop a scale to measure brain fag propensity (the Brain Fag Propensity Scale (BFPS); (ii) to examine the reliability and validity of the BFPS, and (iii) to determine the factor structure of the BFPS.

Methods

In this section, the specific steps taken to develop the new scale, the rationale and items for the new scale are presented and the methods for the validation study are described.

Construct definition: The BFPS was operationalized based on previous conceptualizations of brain fag symptoms in the literature. Specifically, the BFPS construct was thought to comprise of four dimensions: Unpleasant Head Symptoms (UHS); Visual Disturbances (VD); Cognitive Impairment (CI) and Other Disturbances (OD). Item generation was based on considerations regarding the selection of complaints from the direct protocols of patients' complaints and a diligent electronic and manual search of brain fag literature. It was ensured that the items covered all aspects of the brain fag components and complaints.

Widely used instruments in the psychological and psychiatric literature were reviewed for item structure and content thought to be reflective of the dimensions described above. Most of the instruments reviewed contained items that were intended to measure a general construct but were not context-specific. In some instances, selected items thought to be extremely relevant to the current development of the BFPS were found as part of larger multidimensional instruments on depression and anxiety. Additional sample items were recommended based on the clinical observations of the authors. Items were constructed as questions or statements that could be presented in a self-report format. The resulting 22 sample items were presented to panels of external and internal experts in Brain fag as well as a focus group of patients with BFS to address content and face validity issues.

External panel: Four psychiatrists (OO, RC, KM, RE) and two psychologist researchers (FJ, MZ, see Acknowledgements) were asked, via mail, to assist in the evaluation of the items. After being provided with a theoretical rationale for the development effort, the operational definitions of the measurement domains, the sample of items, a set of instructions, and a score sheet, the panellists evaluated each item on the basis of (i) its 'relevance' to the concept of BFP as portrayed in the provided definitions, (ii) its

'conciseness' i.e. its ability to capture and adequately present to patients the main idea of the statement as concisely as possible, and (iii) its 'clarity' i.e. its level of understanding for the prototype patient with BFS that they saw in their research and/or practice. A 5-point ordinal scale (5 excellent, 4 very good, 3 fair, 2 poor, 1 very poor) was used for each rating and panellists provided an explanation of why and what suggestions they might make to improve the item receiving a rating of poor or very poor. Finally, they were asked to contribute additional items where they thought it would be relevant.

Patient focus group: A one hour focus group, moderated by one of the authors (DI) was convened to review the items and address eventual questionnaire format. Twenty participants (ages 13 until 44) meeting Prince and Morakinyo diagnostic criteria [7] for BFS were recruited and gave their reactions to selected items and formats. Consensus of the focus group was that items were best understood if item stems were formatted as statements and the response alternatives were given as ordinal categories from 'rarely or none of the time' to 'most or all of the time'. Based on the focus group results and comments from the expert panels, 27 potential items were generated (5 additional items were added based on comments made by the panellists). Each item was scored on a 4-point Likert Scale (0 rarely or none of the time, 1 a little of the time, 2 some of the time, and 3 most or all of the time).

A total of 250 participants were recruited for this study from two representative secondary schools in Ota, Nigeria. They were randomly selected from Senior Secondary School class 3 and Junior Secondary School class 3. Written consents were obtained from the students and their parents after they were briefed on the aims, objectives and procedure of the study. The students were also guaranteed strict confidentiality after which each of them was requested to respond to following instruments: The Brain Fag Propensity Scale (BFPS), the Brain Fag Syndrome Scale (BFSS), the Index of Peer Relations (IPR), and the Patient Health Questionnaire (PHQ).

A total of 250 questionnaires were administered but 234 were correctly responded to and used for this study (response rate = 93.6%). In order to assess concurrent validity for the candidate BFPS items, participants were administered the 20 BFPS items, the Brain Fag Syndrome Scale (BFSS), the Index of Peer Relations (IPR), and the Patient Health Questionnaire (PHQ). The BFSS was developed by Prince in 1962 and refined by Morakinyo in 1990 [7]. It is the foremost and only instrument developed to measure brain-fag. The BFSS has thee response options viz: 0, 1, 2, corresponding to never, sometimes and often. The highest score obtainable on the BFSS is 14 while the lowest score is 1. The highest score represents a manifestation of the syndrome while the lowest score represents a non manifestation of the syndrome. Diagnosis is reached from a score of 6 and above and an inclusion of either a response of 1 or 2 in items 4 and 5 in such a score. The scale has been in use for the past 48 years on a face validity level. Hence, it measures brain fag based on face validity and inclusion of brain-fag-like symptoms.

The PHQ-9 is the 9-item depression module from the full Patient Health Questionnaire (PHQ) developed by Spitzer, Kroenke and Williams [15]. The PHQ-9 scores each of the 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day). Major depression is diagnosed if 5 or more of the 9 depressive symptom criteria have been present at least "more than half the days" in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia. Other depression is diagnosed if 2, 3, or 4 depressive symptoms have been present at least "more than half the days" in the past 2 weeks, and 1 of the symptoms is depressed mood or anhedonia. One of the 9 symptom criteria ("thoughts that you would be better off dead or of hurting yourself in some way") counts if present at all, regardless of duration. Good agreement has been reported between PHQ-9 diagnosis and that of independent mental health professionals - kappa = 0.65; overall accuracy, 85%; sensitivity, 75%; specificity, 90%13. In a review, PHQ-9 was reported to have a sensitivity of 0.77 (0.71-0.84) and a specificity of 0.94 (0.90-0.97) for the PHQ-9. The positive predictive value in an unselected primary care population was 59%, which increased to 85-90% when the prior probability increased to 30-40% [16].

The PHQ-9 has been validated among students in Nigeria [17]. The internal consistency of questions within the PHQ-9 was 0.85. The PHQ-9 had good concurrent validity with the BDI ($r=0.67$, $P<0.001$). It also had a good ($r=0.894$, $P<0.001$) one month test-retest reliability. Using the Receiver Operating Characteristic (ROC) curve, the optimal cut-off score for minor depressive disorder is 5 (sensitivity 0.897, specificity 0.989, Positive Predictive Value [PPV] 0.875, Negative Predictive Value [NPV] 0.981 and Overall Correct Classification [OCC] rate 0.973) while for major depressive disorder only is 10 (sensitivity 0.846, specificity 0.994, PPV 0.750, NPV 0.996 and OCC rate 0.992).

The IPR is a questionnaire developed in 1986 by Nuris, Hudson, Daley and Newstone [18]. It is a short-form, 25-item self-report questionnaire that is administered to individual adults and young adults over the age of 12 years. Those completing the questionnaire must be literate and have no severe cognitive impairment. The reading level for the IPR is grade 3 and higher. The Index of Peer Relations (IPR) measures the degree, severity or magnitude of problems a client is experiencing in relationships with peers. The IPR was developed specifically to capture information about problems a client is experiencing with peer relationships in general, or with a specific peer group. The client responds to all items on the test form by selecting one response from a 7-point scale ranging from "none of the time" to "all of the time". The IPR has both direct scoring (13) and reverse scoring (12) items. The IPR produces a score ranging from 0 to 100 where a low score indicates the relative absence of the problem being measured, and a higher score indicates the presence of a more severe problem. The cutting score of 30 is the score at which clients may have a clinically significant problem. A score of 70 or higher may indicate the client is experiencing severe distress. The reliability alpha is 0.94 indicating that the scale is internally consistent and that alternative forms should yield consistent results. The Standard Error of

Measurement is 4.44 indicating that the IPR is a relatively accurate measure. The IPR was validated in Nigeria by Anumba [19]. Anumba obtained a mean score of 29.13 for males and 26.83 for females and a divergent correlation coefficient of 0.62.

The Statistical Package for Social Sciences (SPSS-15) [20] was used for statistical analysis. The level of significance was set at 5%. Factor analysis (FA) was used to assess construct internal consistency, reliability and validity of the final selected scale items. Item retention for the final scale was guided by the following criteria: (1) Acceptable item content and face validity (2) Sufficient variation: item did not demonstrate distributional floor or ceiling effects (i.e. a mean difficulty <1 or >3). (3) Maximize internal consistency: only items with a moderate correlation (0.45) with the total scale were retained. (4) Concurrent validity items showing at least moderate relationship with BFSS, PHQ and IPR were included (so as not to exhibit excessive convergent validity with this construct).

Specifically, principal components analysis with varimax rotation was applied to determine the maximum number and nature of the factors comprising of the final scale. Reliability of the final scale was assessed using Cronbach's alpha and the mean inter-item correlation, an indicator of item homogeneity in a scale.

Results

In this study, 234 secondary school students (91 males, 143 females) with age range between 11 to 20 years (14.20 ± 2.14, mean ± S.D.) responded to the questionnaires used for this study. A hundred and twenty respondents were from a public secondary school while 60 from Junior Secondary (JSS3) and 60 from Senior Secondary (SS3) while 114 were from a private secondary school comprising of 60 from Junior Secondary (JSS3) and 53 from Senior Secondary (SS3).

The procedure for FA was conducted in four stages. Stage one involved data analysis in order to determine the data compatibility with FA, establishing the factors, factor rotation and naming or labelling the factors. The first stage was achieved using the Bartlett's test of Sphericity and Kaiser-Meyer-Olkin (KMO) sample sufficiency tests. The 20 items on the Brain Fag Propensity Scale (BFPS) showed a good inter item correlation pointing to the fact that the data was sufficient enough for FA to be applied. The KMO measure of sampling adequacy showed a value of 0.828. This value simply shows that the sample of 234 participants was enough to conduct a factor analysis.

The Bartlett's test of Sphericity showed a significant value (χ^2 (351) = 1742.072, $p < .001$). These values shows further the high correlation matrix found between items on the BFPS. 98% of the communalities on the BFPS were well above 0.31. Overall, the preliminary data analysis shows that the BFPS data was appropriate for FA. The FA was conducted with the Principal Component Analysis (PCA) which "provides a roadmap for how to reduce a complex data set to a lower dimension to reveal the sometimes hidden, simplified structure that often underlie it".

Twenty items were subjected to factor analysis and four factors emerged from the FA result. The four factors explained 43.43% of the total variance. Factor 1 explained 22.827% of the total variance, factor 2 explained 8.425%, factor 3 explained 6.802% of the total variance while factor 4 explained 5.378% of the total variance. The communalities, the variance shared by the variable with other variables, extracted from the FA which a good communality level ranging from 0.192 to 0.685. However, some of the communalities are low for instance; items 3, 23 and 4 have the following communalities 0.192, 0.253 and 0.276 respectively. These items were retained since the items did not load on two factors. We adopted a common cut-off score of 0.31 as the criteria for selection of factorially pure items [21,22].

From Table 1, it could be seen that the selected items on the factorial loading was between 0.816 and 0.346. Further, with regards to communalities, it was observed to be between 0.192 and 0.685. However, only items 4, 3, and 23 were below 0.3. These items were retained because they significantly loaded on different factors without being ambiguous by loading on other factors concurrently.

Table 1: Factor loadings and communalities on the BFPS with varimax rotation

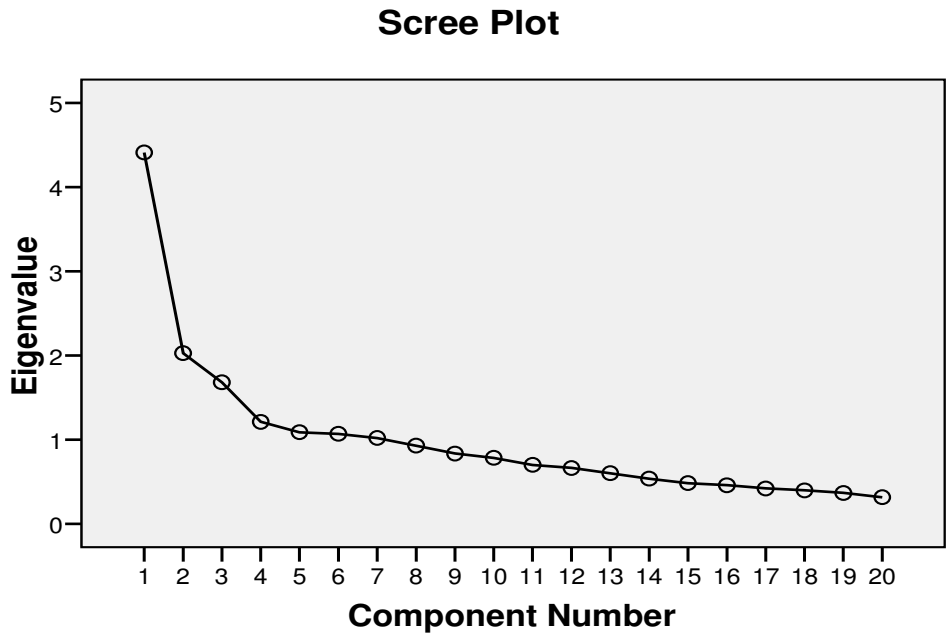
Item no	Item on BFPS	Factor 1 Cognitive Impairment	Factor 2 Other Disturbances	Factor 3 Visual Disturbances	Factor 4 Unpleasant Head Symptoms	Communalities
11	I find it difficult to remember things	.728				.539
12	I feel tired when I want to read	.679				.543
27	I find it difficult to concentrate while studying	.672				.474
8	I do not understand the meaning of what I am reading	.650				.523
9	I do not understand the meaning of what I am being taught	.628				.465
10	I lose concentration easily	.608				.404
18	I feel very tired while studying	.591				.423
19	I am under pressure to pass my examinations	.527				.305
25	I experience headaches during examinations	.470				.341
15	Some things are crawling inside my body		.743			.600
4	Some things crawl inside my head		.450			.276
7	I produce tears without any reason		.445			.304
6	I experience pain in my eyes			.706		.512
5	I cannot see properly after reading			.595		.418
2	I feel pain inside my head			.595		.391
13	My head spins [I feel dizzy] while reading			.566		.407
3	It seems my head is burning			.346		.192
21	I take coffee to keep awake during examinations				.816	.685
20	I take a form of energy drink to be able to keep awake and read for my examinations				.723	.450
23	I read all through the night during examination periods				.475	.253

Extraction Method: PCA with varimax rotation (Kaiser criteria). a Rotation converged in 6 iterations.

Out of the 27 items subjected to factor analysis, 7 items loaded on more than one factor. These are: items 1(factors 1 & 2), 14(factors 1 & 2), 16(factors 2 & 3), 17(factors 1 & 2), 22(factors 2 & 4), 24 (factors 1 & 2) and 26(factors 1 & 2). Hence, in line with Kline [22], we eliminated items which loaded significantly on more than one factor as a result of the ambiguity in explaining these items. After eliminating the ambiguous items, twenty (20) pure and valid items loaded differently only on each of the four factors. These are items 11, 12, 27, 8, 9, 10, 18, 19, 25, 15, 4, 7, 6, 5, 2, 13, 3, 21, 20, 23. These 20 items are the items on the factorially valid Brain Fag Propensity Scale.

Factor 1, which we labelled Cognitive Impairment, has 9 items (11, 12, 27, 8, 9, 10, 18, 19, 25,) loaded significantly on it. Factor 2, which we labelled Other Disturbances, has 3 items (15, 4, 7) loaded significantly on it. Factor 3, which we labelled Visual Disturbances, has 5 items (6, 5, 2, 13, 3) significantly loaded on it while Factor 4, which we labelled Unpleasant Head Symptoms, has 3 items (21, 20, 23) significantly loaded on it. In all, the factorially validated BFPS has a total of 20 valid items loaded significantly on it. It is important to note that the factors were labelled following the criteria by Prince [11].

Figure 1: Scree plot of the factorially validated version of the BFSS showing 20 valid items



We also plotted a scree graph of the BFPS for the 20 valid items which were as a result of the factor analysis. This is based on the eigen values [22,23]. From the scree plot (see Figure 1) of the BFPS, it could be seen that factors 1 to 4 contributed majorly to the curve before the graph gradually declined. However,

it important to note that each of the items including the ambiguous and eliminated items contributed to the scree plot while some significantly contributed, some did not.

Reliability and validity

We established the reliability of the 20-item factorially valid BFPS and got the following reliabilities: Cronbach Alpha: 0.795. Split half reliability of 0.813 for the part 1 (10 (a) items) and 0.585 for the part 2 (10 (b) items) with a spearman-Brown coefficient of 0.557 for equal and unequal length. The intrinsic validity[24] was also established for the BFPS which yielded a coefficient of 0.892. The empirical factor analysis and the analysis of internal consistency have shown the construct validity of the BFPS.

Construct validity of the BFSS

Convergent Validity

The convergent validity of the BFPS was established using the Brain Fag Syndrome Scale (BFSS). The BFSS and the BFPS share a common denominator of Brain Fag Syndrome. To establish this empirically, a correlation coefficient was calculated with the BFSS. The analysis of the BFPS and the BFSS yielded a significant two-tailed correlation coefficient of 0.200, ($p = 0.0001$). We went further to attempt another convergent validity with another similar construct, depression, measured by the Patient Health Questionnaire and peer relations using Index of Peer Relations (IPR). We observed a correlation coefficient of 0.236 ($p = 0.0001$) with the PHQ and correlation coefficient of 0.242 ($p < 0.001$) with the IPR.

Discussion

In the current study, we report the development and validation of a novel instrument for the assessment of propensity to brain fag. We describe a multidimensional 20-item scale, the BFSP, which demonstrates excellent reliability as well as good content, and concurrent validity. There is growing evidence that psychological factors including certain forms of stress are at least partially responsible for maintenance and exacerbation of brain fag symptoms. BFS sufferers, especially those who seek medical attention, have increased levels of affective, anxiety symptoms [7,14,25]. However, many of these sufferers do not reach criteria for Brain Fag Syndrome, an affective disorder and many report normal levels of anxiety on standardized scales and these sub-threshold cases would be missed in clinical practice if they seek medical attention. We have hypothesized that most of these complaints were Brain Fag related complaints but not Brain Fag Syndrome and that patients presenting such complaints had the proclivity or the propensity of the complaints exacerbating to Brain Fag Syndrome. BFPS has the potential to be a suitable marker of the characteristic cognitive and affective processes in BFS.

The BFPS is a readily administered 20-item self-report questionnaire designed to measure unpleasant head symptoms, visual disturbances, cognitive and other disturbances that occur in the context of academia. Empirical validation in 234 students supported a multidimensional scale and concurrent validity. Face validity was supported by patient focus group and expert opinion endorsing the relevance of items to BFPS and the

concept of Brain Fag Propensity. The BFPS was shown to have high levels of convergent validity with other measures including the BFSS, the PHQ, and the IPR.

In bivariate relationships, the BFPS was moderately correlated with measures of brain fag syndrome, of depression and of anxiety in interpersonal relationship. Thus, brain fag propensity appears to fall within the larger class of brain fag and is also moderately, but not strongly, related to a similar domain of depression, and social anxiety.

The factor analysis in this study supported the construct validity of Brain Fag Syndrome and its factors. With regard to BFS, 4 conceptual factors emerged in literature [4,10]. This cluster of symptoms include somatic complaints such as pain and burning sensations around the head and neck; other somatic impairments such as blurring, eye pain and excessive tearing; cognitive impairments such as inability to grasp the meaning of written and sometimes spoken words, and inability to concentrate and inability to concentrate and poor retention; and fatigue and sleepiness in spite of adequate rest. This cluster of symptoms always occurs in relation to studying often militates against the student's ability to study. It is on the basis of this that the Brain Fag Syndrome Scale (BFSS), which was initially constructed by Prince in 1962, was refined by Morakinyo and Prince in 1980 [25]. However, the BFS scale showed two dimensional structures [12] which is in contrast to findings in the literature which focus on four dimensions. Hence, the 4 factor model of BFPS in our study represented a better fit to the original findings and conceptualization of Brain Fag Syndrome by Prince [11] than the two factor model of the BFSS.

The results of the scree graphic are based on eigenvalues and factorial analysis carried out in this study suggest that the scale structure should be four factorial. The four factorial structures are also more appropriate when considered in terms of the decreases in the scree graphics, and the ease of item identification and interpretation. The first factor of covers the items of somatic complaints such as pains and burning sensations around the head and neck and is labelled "Unpleasant Head symptoms". The second factor covers other somatic impairments such as blurring, eye pain and excessive tearing and is labelled "Visual disturbances". The third factor covers inability to grasp the meaning of written and sometimes spoken words, and inability to concentrate and inability to concentrate and poor retention and is therefore labelled "Cognitive impairments". The fourth factor covers fatigue and sleepiness in spite of adequate rest and is therefore labelled "Sleep disturbance". As a result, it can be said that the factorial structure of the BFPS is in accordance with 4 conceptually defined and empirically validated factors in the literature of BFS.

Despite the important contributions of this study, several caveats and future directions are noted. First, this study only focused on Yoruba adolescent students and findings may not be generalisable to students of other ethnic groups or of higher education. Further studies are needed to see if findings would be similar across ethnicity and strata of education. Second, the sample

size is small. However, even though the sample size is small, it can be said that the number is sufficient when the number of items and options are considered. Kass and Tinsley [26] suggest that in factor analysis, for a sample group up to 300 people, each scale item requires a participant distribution of 5 to 10. Third, although it was not possible to evaluate test-retest reliability in this sample due to the limited time the schools could contribute to future data collection; this would be an important aspect to evaluate in the future. However, the BFPS appeared to have good internal consistency.

Conclusion

The current results indicate the BFPS should have significant utility as a brief, valid measure of propensity to develop brain fag syndrome or sub-threshold cases of BFS. Further, empirical work to support the initial reliability and validity should include replication in other student samples, convergent/divergent validity studies with other measures thought to have important explanatory roles in BFS and assessment of sensitivity to treatment outcome/change.

Acknowledgements

The authors would like to thank Miss Temitope Adeoye, Mr. Ben Agoha, Mrs. Oluwadare, the of Faith Academy, and Mr. Lashilo, the Vice Principal of Iganmode Grammar School, for their assistance during the course of this research. We would also express our sincere appreciation to the panelists: Doctors Olugbenga Owoeye, Rotimi Coker, Kola Mosaku, Rasheed Erinfolami, Folasade Jinadu and Matthew Zachariah.

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Corresponding author: *Bolanle A. Ola, Department of Behavioural Medicine, Faculty of Clinical Sciences, Lagos State University College of Medicine, PMB 21266, Ikeja, Lagos, Nigeria.*

E-mail: wobola@yahoo.com.

Received: 27 February 2011 Accepted: 9 Mac 2011